

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-16 (Cancelled).

Claim 17 (Currently Amended): A surface inspection method ~~characterized in~~ using a surface inspection apparatus, the surface inspection apparatus comprising:

a light source structurally configured to apply a light to a surface of an object to be measured;

an objective lens structurally configured to receive a reflected light applied from the light source and reflected on the surface of the object to be measured, the objective lens being located at a position opposite to the surface of the object to be measured;

an illumination switchover member structurally configured to switch over both bright-field illumination and dark-field illumination, the bright-field illumination being that in which the light from the light source is made parallel with an optical axis of the objective lens and applied to the object to be measured through the objective lens, and the dark-field illumination being that in which the light from the light source is made ring-shaped and applied obliquely with respect to the optical axis of the objective lens such that there is a focus on the surface of the object to be measured, and the illumination switchover member being provided in a light path between the light source and the object to be measured;

a light detection member structurally configured to detect a component incident on the objective lens from a parallel direction with the optical axis of the objective lens in the reflected light received by the objective lens and obtaining a light quantity thereof; and

a rotatable disc-shaped plate having a plurality of openings of different sizes, the plate provided in an optical path between the objective lens and the light detection member, and the openings controlling the quantity of light passing through the plate into the light detection member; and

the surface inspection method characterized by the steps of observing an abnormal portion of the object to be measured with a naked eye of a user of the surface inspection apparatus while varying an angle in which a difference from a normal portion is observed, selecting a condition of the angle in which the difference from the normal portion can be notably distinguished, and using the selected condition of the angle as an irradiation angle for the light,

wherein the illumination switchover member comprises a bright-field/dark-field illumination switchover slide that slides in a direction perpendicular to both an optical axis of a collimate lens for refracting light from the light source and perpendicular to an optical axis of the objective lens, and along the sliding direction, a circular half-mirror portion for the bright-field illumination and a ring-shaped fully-reflective-mirror portion for the dark-field illumination are provided in parallel with each other, an inner portion of the ring-shaped fully-reflective-mirror portion for the dark-field illumination being a light-pass portion, such that on a periphery of the objective lens, a ring-shaped dark-field illumination lens is provided, and the ring-shaped dark-field illumination lens is structurally configured such that light reflected on the ring-shaped fully-reflective-mirror portion in a direction of the optical axis of the objective lens is refracted by the ring-shaped dark-field illumination lens in an oblique direction toward the surface of the object to be measured.

Claim 18 (Canceled).

Claim 19 (Currently Amended) The surface ~~apparatus~~ inspection method

~~characterized in using the surface inspection apparatus~~ according to claim ~~18~~ 17, wherein:

in the ring-shaped dark-field illumination lens, plural kinds of various refractive indices are provided, and by properly selecting and using the plural kinds of various refractive indices, either the irradiation angle to the surface of the object to be measured or the irradiation angle for the light with respect to the optical axis of the objective lens can be adjusted.

Claim 20 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus~~ according to claim 17, wherein the dark-field illumination is employed by the illumination switchover member.

Claim 21 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus~~ according to claim 17, wherein the light detection member comprises a calculation member structurally configured to convert a light quantity of a light having passed through one of a plurality of openings in the rotatable disc-shaped plate on a basis of a light quantity detected when a standard sample is used as the object to be measured.

Claim 22 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus of~~ according to claim 17, wherein the surface of the object to be measured is irradiated with a light to produce an irradiation light so that the irradiation light is reflected on the surface of the object to be measured to produce a reflected light, and in the reflected light, a component parallel with the optical axis of the objective lens which is provided at the position opposite to the object to be measured is made incident on the rotatable disc-shaped plate through the objective lens to produce an incident light, and in the incident light, only a component having passed through one of a plurality of openings

of the rotatable disc-shaped plate from the objective lens is received to produce a received light, and a light quantity of the received light is obtained.

Claim 23 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus~~ according to claim 17, wherein the surface of the object to be measured is irradiated with a light to produce an irradiation light so that the irradiation light is reflected on the surface of the object to be measured to produce a reflected light, and in the reflected light, only a component which is in almost one direction is made incident on the rotatable disc-shaped plate through a tubular member to produce an incident light, and in the incident light, a light quantity of only a component having passed through one of a plurality of openings of the rotatable disc-shaped plate from the tubular member is obtained.

Claim 24 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus~~ according to claim 17, wherein the surface of the object to be measured is irradiated with a light to produce an irradiation light such that the irradiation light is reflected on the surface of the object to be measured to produce a reflected light, and the reflected light is made incident on the rotatable disc-shaped plate through an optical fiber cable to produce an incident light, and in the incident light, a light quantity of only a component having passed through one of a plurality of openings of the disc-shaped plate from the optical fiber cable is obtained.

Claim 25 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus~~ according to claim 22, wherein a light detection extent in the surface of the object to be measured is controlled by changing a size of one of the plurality of openings of the rotatable disc-shaped plate and a magnification of the objective lens.

Claim 26 (Currently Amended) The surface inspection method ~~characterized in~~
~~using the surface inspection apparatus~~ according to claim 23, wherein a light detection extent
in the surface of the object to be measured is controlled by changing a size of one of the
plurality of openings of the rotatable disc-shaped plate and a magnification of the objective
lens.

Claim 27 (Currently Amended) The surface inspection method ~~characterized in~~
~~using the surface inspection apparatus~~ according to claim 24, wherein a light detection extent
in the surface of the object to be measured is controlled by changing a size of one of the
openings of the rotatable disc-shaped plate and a magnification of the objective lens.

Claim 28 (Currently Amended) The surface inspection method ~~characterized in~~
~~using the surface inspection apparatus~~ according to claim 22, wherein the light quantity of the
received light is converted on a basis of a light quantity detected when a standard sample is
used as the object to be measured.

Claim 29 (Currently Amended) The surface inspection method ~~characterized in~~
~~using the surface inspection apparatus~~ according to claim 17, wherein the object to be
measured is made of a synthetic resin.

Claim 30 (Currently Amended) A surface inspection method ~~characterized in~~ using a
surface inspection apparatus, the surface inspection apparatus comprising:

light source applying means for applying a light to a surface of an object to be
measured;

objective lens receiving means for receiving a reflected light applied from the light
source applying means and reflected on the surface of the object to be measured, the
objective lens receiving means being located at a position opposite to the surface of the object
to be measured;

illumination switchover means for switching over both bright-field illumination and dark-field illumination, the bright-field illumination being that in which the light from the light source applying means is made parallel with an optical axis of the objective lens receiving means and applied to the object to be measured through the objective lens receiving means, and the dark-field illumination being that in which the light from the light source applying means is made ring-shaped and applied obliquely with respect to the optical axis of the objective lens receiving means such that there is a focus on the surface of the object to be measured, and the illumination switchover means being provided in a light path between the light source applying means and the object to be measured;

light detection means for detecting a component incident on the objective lens receiving means from a parallel direction with the optical axis thereof in the reflected light received by the objective lens receiving means and obtaining a light quantity thereof; and

a rotatable disc-shaped plate having a plurality of openings of different sizes, the plate provided in an optical path between the objective lens receiving means and the light detection means, and the openings controlling the quantity of light passing through the plate into the light detection means,

the surface inspection method characterized by the steps of observing an abnormal portion of the object to be measured with a naked eye of a user of the surface inspection apparatus while varying an angle in which a difference from a normal portion is observed, selecting a condition of the angle in which the difference from the normal portion can be notably distinguished, and using the selected condition of the angle as an irradiation angle for the light,

wherein the illumination switchover means comprises a bright-field/dark-field illumination switchover slide that slides in a direction perpendicular to both an optical axis of

a collimate lens for refracting light from the light source applying means and perpendicular to

an optical axis of the objective lens receiving means, and along the sliding direction, a
circular half-mirror portion for the bright-field illumination and a ring-shaped fully-
reflective-mirror portion for the dark-field illumination are provided in parallel with each
other, an inner portion of the ring-shaped fully-reflective-mirror portion for the dark-field
illumination being a light-pass portion, such that on a periphery of the objective lens
receiving means, a ring-shaped dark-field illumination lens is provided, and the ring-shaped
dark-field illumination lens is structurally configured such that light reflected on the ring-
shaped fully-reflective-mirror portion in a direction of the optical axis of the objective lens
receiving means is refracted by the ring-shaped dark-field illumination lens in an oblique
direction toward the surface of the object to be measured.

Claim 31 (Canceled)

Claim 32 (Currently Amended) The surface inspection method ~~characterized in~~
~~using the surface inspection apparatus~~ according to claim 31-30, wherein in the ring-shaped
dark-field illumination lens, plural kinds of various refractive indices are provided, and by
properly selecting and using the plural kinds of various refractive indices, either the
irradiation angle to the surface of the object to be measured or the irradiation angle for the
light with respect to the optical axis of the objective lens receiving means can be adjusted.

Claim 33 (Currently Amended) The surface inspection method ~~characterized in~~
~~using the surface inspection apparatus~~ according to claim 30, wherein the dark-field
illumination is employed by the illumination switchover means.

Claim 34 (Currently Amended) The surface inspection method ~~characterized in~~
~~using the surface inspection apparatus~~ according to claim 30, wherein the light detection
means comprises calculation means for converting a light quantity of a light having passed

through one of a plurality of openings in the rotatable disc-shaped plate on a basis of a light quantity detected when a standard sample is used as the object to be measured.

Claim 35 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus of~~ according to claim 30, wherein the surface of the object to be measured is irradiated with a light to produce an irradiation light so that the irradiation light is reflected on the surface of the object to be measured to produce a reflected light, and in the reflected light, a component parallel with the optical axis of the objective lens receiving means which is provided at the position opposite to the object to be measured is made incident on the rotatable disc-shaped plate through the objective lens receiving means to produce an incident light, and in the incident light, only a component having passed through one of a plurality of openings of the rotatable disc-shaped plate from the objective lens receiving means is received to produce a received light, and a light quantity of the received light is obtained.

Claim 36 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus~~ according to claim 30, wherein the surface of the object to be measured is irradiated with a light to produce an irradiation light so that the irradiation light is reflected on the surface of the object to be measured to produce a reflected light, and in the reflected light, only a component which is in almost one direction is made incident on the rotatable disc-shaped plate through a tubular member to produce an incident light, and in the incident light, a light quantity of only a component having passed through one of a plurality of openings of the rotatable disc-shaped plate from the tubular member is obtained.

Claim 37 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus~~ according to claim 30, wherein the surface of the

object to be measured is irradiated with a light to produce an irradiation light such that the irradiation light is reflected on the surface of the object to be measured to produce a reflected light, and the reflected light is made incident on the rotatable disc-shaped plate through an optical fiber cable to produce an incident light, and in the incident light, a light quantity of only a component having passed through one of the plurality of openings of the rotatable disc-shaped plate through the optical fiber cable is obtained.

Claim 38 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus~~ according to claim 35, wherein a light detection extent in the surface of the object to be measured is controlled by changing a size of one of the plurality of openings of the rotatable disc-shaped plate and a magnification of the objective lens receiving means.

Claim 39 (Currently Amended) The surface inspection method ~~characterized in using a surface inspection apparatus~~ according to claim 36, wherein a light detection extent in the surface of the object to be measured is controlled by changing a size of one of the plurality of openings of the rotatable disc-shaped plate and a magnification of the objective lens receiving means.

Claim 40 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus~~ according to claim 37, wherein a light detection extent in the surface of the object to be measured is controlled by changing a size of one of the plurality of openings of the rotatable disc-shaped plate and a magnification of the objective lens receiving means.

Claim 41 (Currently Amended) The surface inspection method ~~characterized in using the surface inspection apparatus~~ according to claim 35, wherein the light quantity of the

received light is converted on a basis of a light quantity detected when a standard sample is used as the object to be measured.

Claim 42 (Currently Amended) The surface inspection method ~~characterized in~~
~~using the surface inspection apparatus~~ according to claim 30, wherein the object to be measured is made of a synthetic resin.

Claim 43 (New): A method for surface inspection, comprising:

first steps for naked eye observation, the first steps including:

- (a1) reflecting polarized light off a surface of an object to be measured;
- (b1) observing a portion of the object with the naked eye at various angles;
- (c1) selecting an angle at which a difference from a normal position can be notably distinguished; and
- (d1) using the selected angle as an irradiation angle for light applied to the object;

second steps, following the first steps, for preservation of objective visual information, the second steps including:

- (a2) if the selected angle equals zero degrees, using bright field illumination, and, if the selected angle equals other than zero degrees, using dark field illumination;
- (b2) passing light reflected off the surface of the object through an objective lens; and
- (c2) passing the reflected light that is incident to the objective lens and parallel to the optical axis of the objective lens through an opening of variable size, wherein the configuration of the surface inspection apparatus prevents light that is not incident to the objective lens and parallel to the optical axis of the objective lens from passing

through the opening, the opening providing the only path to a light detection member, and the light passing to the light detection member being limited by the size of the opening and chosen magnification of the objective lens, and

wherein the surface condition of the object is measured with a high degree of accuracy and high correlation to naked eye observation, and the visual information pertaining to the surface condition is preserved via the light detection member.

Claim 44 (New): The method as claimed in Claim 43, wherein in the second steps the reflected light is passed through an objective lens of less than 10x magnification.

Claim 45 (New): The method as claimed in Claim 43, wherein in the second steps the reflected light that is incident to the objective lens and parallel to its optical axis is passed through an opening of size ranging from 0.2 to 30 mm.